REMARKS/ARGUMENTS

Claims 1-20 are pending. The Office Action rejects claims 1-3, 7, 8, 11, 14, and 15-18 under 35 U.S.C. §102(a) as anticipated by "Micropatterning of small molecular weight organic semiconductor thin films using organic vapor phase deposition" (Shtein), rejects claims 1-3, 7, 8, 11, and 14-18 under §102(b) as anticipated by "Micron-scale patterning of organic thin films using organic vapor phase deposition" (Shtein II), rejects claims 1-3, 7, 8, 11, and 14-18 under §103(a) as unpatentable over each of Shtein and Shtein II, and rejects claims 1-20 under §103(a) as unpatentable over various combinations of Shtein, U.S. Patent No. 4,788,082 (Schmitt), "Angular Distribution of Flow from Orifices and Tubes at High Knudsen Numbers" (Stickney), U.S. Patent No. 6,468,605 (Shah), "Vacuum Technology" (Kirk-Othmer), and U.S. Patent No. 5,709,906 (Bickford). These rejections are respectfully traversed.

35 U.S.C. §102 Rejections: Shtein

Shtein Does Not Disclose the Claimed OVJP Features.

To anticipate a claim, a reference must disclose each and every feature set forth in the claim, in as complete detail and in the same arrangement as recited in the claim. M.P.E.P. §2131 (emphasis added). Independent claim 1 recites, in relevant part:

> ejecting the carrier gas carrying the organic material **from the nozzle** at a flow velocity that is at least 10% of the thermal velocity of the carrier gas;
>
> wherein a region between the nozzle and the substrate surrounding the carrier gas has a **dynamic pressure of at least 1 Torr**,
>
> and wherein at least one of the nozzle diameter, the nozzle length, and nozzle-to-substrate separation is about equal to the gas mean free path length.

Independent claim 11 recites similar features. Initially, it is noted that Shtein describes two separate deposition techniques: organic vapor **phase deposition** (OVPD), and organic vapor **jet printing** (OVJP). The majority of Shtein describes OVPD; only section VII refers to OVJP.

Notably, section VII is also the only portion of Shtein that refers to a nozzle or a jet of organic vapor. This is unsurprising, since OVPD operates in a diffusive regime using a mask, and does not use a collimated jet of material ejected from a nozzle.

The Office Action combines features from both deposition techniques in rejecting the claims. Instead of demonstrating that Shtein anticipates the claims, this analysis indicates that Shtein cannot anticipate the claims, since the features relied on by the Office Action are not presented in as complete detail and in the same arrangement as the claims, as is required to support a rejection under §102. Several of the features cited by the Office Action are described in further detail below.

With regard to the recited dynamic pressure, the Office Action cites to the entirety of Shtein, and specifically section VII, as disclosing background pressures of 0.1-10 Torr, and asserts that such pressures would inherently result in the claimed dynamic pressure. However, the background pressures of 0.1-10 Torr cited by the Office Action are only described in relation to OVPD. With regard to OVJP, Shtein is completely silent as to background, dynamic, or any other pressure. Thus, regardless of whether the Office Action's inherency analysis is correct, which Applicants do not concede, Shtein fails to disclose ejecting the carrier gas carrying the organic material from the nozzle, wherein a region between the nozzle and the substrate surrounding the carrier gas has a dynamic pressure of at least 1 Torr as recited in the claims.

Similarly, the substrate separation, aperture depth, and thickness described by Shtein's Figure 6 relate to the mean free path in OVPD. The only mention of the mean free path in section VII is a statement that a "collimated jet can result in a deposit with well-defined edges even for *s* >> mfp." Page 4015, col. 1, lines 22-23 (emphasis added). Thus, not only does Shtein fail to disclose "at least one of the nozzle diameter, the nozzle length, and nozzle-to-substrate separation is about equal to the gas mean free path length" as recited in the claims, in fact it describes a nozzle-substrate separation much greater than the mean free path. Further, the dimensions described in Figure 6 are for a mask used with OVPD, not for a nozzle. Again, the Office Action relies on features from two separate deposition techniques to support the anticipation rejection and, therefore, the rejection is improper.

For at least these reasons, Shtein fails to disclose each and every feature recited in the claims. Withdrawal of the rejections is respectfully requested.

Shtein Fails to Disclose a Guard Flow.

Claim 11 recites, in relevant part "providing a guard flow around the carrier gas." Shtein merely describes simulating a single jet of material in section VII and, as previously noted, the remainder of the reference fails to disclose even a single jet. There is simply no description or suggestion of a guard flow as recited in the claims, and the Office Action does not indicate any other feature in Shtein that is reasonably interpreted as a guard flow. For at least this reason, claim 11 and all claims dependent therefrom are not anticipated by Shtein. Withdrawal of the rejections is respectfully requested.

35 U.S.C. §102 Rejections: Shtein II

As described with respect to Shtein above, Shtein II refers almost exclusively to organic vapor **phase** deposition. There is only one brief mention of **jet** deposition at page 12, with no indication of how it relates to the OVPD techniques described in the rest of the presentation, if at all. The mere mention of a jet deposition technique is entirely insufficient to support the §102 rejection of the claims.

The Office Action attempts to remedy this defect in Shtein II by interpreting the recited term "nozzle" to include a mask as used in OVPD, thus interpreting Shtein II's masked OVPD as a jet deposition technique. However, it is respectfully noted that during examination, claim terms must be given the broadest reasonable interpretation that is consistent with the specification and with the interpretation that those skilled in the art would reach. M.P.E.P. §2111 (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 75 USPQ2d 1321 (Fed. Cir. 2005) and *In re Cortright*, 165 F.3d 1353, 1359, 49 USPQ2d 1464, 1468 (Fed. Cir. 1999)) (emphasis added). The Office Action's interpretation is consistent with neither.

First, the Office Action's interpretation is inconsistent with use of the terms in the art. Evidence of this is provided by the first Shtein reference cited in the Office Action, which

specifically indicates that the use of a jet is a separate technique from OVPD techniques that require use of a mask:

> [U]nder certain conditions, the diffusive transport in the boundary layer can be <u>replaced by</u> relatively high velocity carrier gas jets…we modeled a <u>jet</u> of carrier gas delivered through a small-diameter capillary, or nozzle, onto a cooled substrate (p. 4015, col. 1, lines 18-23 (emphasis added)).
>
> Advantages [of jet deposition] <u>over conventional shadow-masked deposition</u> include further economy of the source material, reduction of complexity associated with manipulation and cleaning of large masks, <u>elimination</u> of pre-deposition substrate patterning (e.g., the <u>integrated shadow mask</u>), and the ability to conformally coat nonplanar substrates. (p. 4015, col. 2, lines 44-50 (emphasis added)).

Shtein indicates that a nozzle can be used to <u>replace or eliminate</u> the masks used in OVPD systems. Thus, one of skill in the art would not interpret the recited nozzle to include a mask as used in the OVPD technique described in Shtein II. The Office Action's interpretation is contrary to the interpretation that would be reached by one of skill in the art and, therefore, is not a reasonable interpretation.

Second, the Office Action's interpretation is inconsistent with the specification. The specification describes OVPD using a shadow mask at paragraph 0005 of the published application. OVJP using a jet and nozzle is described at paragraph 0027, and is explicitly contrasted against other techniques such as OVPD. Thus, the Office Action's interpretation of OVPD performed with a mask as equivalent to OVJP is inconsistent with the specification.

For at least these reasons, the Office Action's proposed interpretation is inaccurate, and fails to support the §102 rejection of the claims.

Shtein II also fails to describe "providing a guard flow around the carrier gas" as recited in claim 11. As previously described, Shtein II merely describes OVPD using a shadow mask. There is simply no description or suggestion of a guard flow as recited in the claims. For at least this reason, claim 11 and all claims dependent therefrom are not anticipated by Shtein II. Withdrawal of the rejections is respectfully requested.

35 U.S.C. §103 Rejections

Shtein and Shtein II

The Office Action repeats the analysis applied under §102, and further states that it would be obvious to adjust the flow velocity relative to the thermal velocity to obtain the recited features. However, this analysis fails to remedy the defects of Shtein and Shtein II described above. Specifically, neither reference discloses or suggests ejecting a carrier gas from a nozzle at a flow velocity that is at least 10% of the thermal velocity of the carrier gas, wherein a region between the nozzle and the substrate surrounding the carrier gas has a dynamic pressure of at least 1 Torr, and wherein at least one of the nozzle diameter, the nozzle length, and nozzle-to-substrate separation is about equal to the gas mean free path length. Withdrawal of the rejections is respectfully requested.

Shtein and Schmitt

The Office Action rejects all the pending claims as obvious over Schmitt in view of Shtein and various combinations of other references. However, the primary combination of Schmitt and Shtein is improper.

Schmitt describes a deposition process for creating blanket thin films on a substrate, such as to protect the substrate. *See, e.g.,* col. 1, lines 25-34. Schmitt indicates that uniform coatings are preferable, and describes several ways to avoid or reduce the effect of "stagnation points" that cause the deposited film to be non-uniform. *See* col. 4, line 45 – col. 5, line 7; FIG. 11 and related text.

In contrast, the portion of Shtein cited by the Office Action describes a masked OVPD technique which intentionally creates a non-uniform film having regions with substantially higher deposition thickness. *See, e.g.,* p. 4014, Figs. 14-15. Adding Shtein's mask or a similar feature to Schmitt would result in a protective coating as described by Schmitt, but with regions of more or less material – or even no material at all. Such a coating would be completely unsuitable for use as the protective coating described by Schmitt. Thus, the combination proposed by the Office Action would render Schmitt unsuitable for its intended purpose. It is

also respectfully noted that the portions of Shtein cited by the Office Action (p. 4014 and 4007-09) describe various diffusive deposition techniques that require the use of a mask and, as previously described, are separate from the jet deposition technique described in Shtein's section VII.

For at least these reasons, the combinations proposed by the Office Action are improper, and fail to render obvious ejecting a carrier gas carrying an organic material from a nozzle at a flow velocity that is at least 10% of the thermal velocity of the carrier gas, such that the organic material introduced with the carrier gas into the nozzle is deposited onto a substrate, separated from the nozzle, forming a patterned film of the organic material on the substrate, the patterned film comprising a plurality of pixels as required by the claims.

The other cited references fail to remedy the defects of the Schmitt/Shtein combination described above. Specifically, whether taken alone or in combination, none of the references describe or suggest ejecting a carrier gas carrying an organic material from a nozzle at a flow velocity that is at least 10% of the thermal velocity of the carrier gas, such that the organic material introduced with the carrier gas into the nozzle is deposited onto a substrate, separated from the nozzle, forming a patterned film of the organic material on the substrate, the patterned film comprising a plurality of pixels, wherein a region between the nozzle and the substrate surrounding the carrier gas has a dynamic pressure of at least 1 Torr, and wherein at least one of the nozzle diameter, the nozzle length, and nozzle-to-substrate separation is about equal to the gas mean free path length. Withdrawal of the rejections and reconsideration is respectfully requested.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 202-481-9900.

The Commissioner is authorized to charge any fees due or credit any overpayment to the deposit account of Townsend and Townsend and Crew LLP, Deposit Account No. 20-1430.

Respectfully submitted,

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DATE: August 5, 2008

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